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Human mobile accelerometry: experience from clinical studies and application to astronauts

Mobile accelerometry and the use of "wearables" is a rapidly expanding field that allows to study human motion in an uncontrolled environment.

We discuss opportunities and limitations depending on sensor positioning and sensor type as well as usability aspects of various platforms.

Focused on our own experience with a 3D accelerometer in a belt buckle ("actibelt") we show applications in clinical trials (e.g. multiple sclerosis, sarcopenia, fracture healing) using a set of novel outcome parameters (e.g. real life gait speed, falls, jumping power, steps, step ratio, sleep quality, gait and running style etc.) and discuss the path to regulatory acceptance (EMA/FDA). An interesting aspect is the dual role of physical activity both as outcome parameter and treatment option in the form of exercise therapy. We show examples of implementing exercise therapy in drug trials and feasibility tests done with ESA, NASA and in the context of mars500.